Manual de Instalación de RTLinux

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Instalación de RTLinux 1
1. Obtención de la distribución RTLinux y el código fuente de Linux..... 1
2. Copia del código fuente y la distribución 1
3. Antes de comenzar con la instalación 2
4. Parcheado del Kernel 3
5. Configuración del Kernel..... 3
6. Configuración del Gestor de arranque..... 4
7. Reiniciar el ordenador..... 6
8. Configurar RTLinux 6
9. Compilar RTLinux 6
10. Fin. Ya tiene su sistema de Tiempo Real Linux instalado. 6
Anexo: GNU Free Documentat ion License..... 7

Instalación de RTLinux

1. Obtención de la distribución RTLinux y el código fuente de Linux

Es necesario disponer del código fuente del kernel de Linux y de una distribución de RTLinux.

> Nota: Las distribuciones de RTLinux no son validas para todos las versiones del kernel de Linux. Soportan al menos las versiones 2.2.x y 2.4.x. Mas adelante se explica como se comprueba si es valida.

En el caso del código fuente de Linux se puede obtener desde www.kernel.org o en los cedes de alguna de las distribuciones de Linux.

Para obtener la distribución de RTLinux deberemos acceder a www.fsmlabs.com/products/openrtlinux/, rellenar un formulario y con ello podremos descargarnos la última versión de RTLinux bajo la licencia GNU/GPL v2.

2. Copia del código fuente y la distribución

El código fuente de Linux normalmente se encuentra en el directorio `/usr/src/linux`, que normalmente también es un enlace al directorio `/usr/src/linux.2.*.*` que contiene la versión del kernel instalada.

2.1. Si la versión descargada es igual a la que tenemos no haremos nada y pasaremos al siguiente punto. En caso contrario sería conveniente guardar la versión antigua. Si esta con la estructura de directorios anterior no hace falta hacer nada, pero sino se haría:

```
cp linux linux.old
```

2.2. Descomprimimos la versión descargada de Linux.

```
cd /usr/src/
tar xzf linux.2.x.y.tar.gz
```

Al realizar esto se ha creado un nuevo directorio `/usr/src/linux.2.x.y` correspondiente a la versión descargada. Ahora modificamos el enlace `/usr/src/linux` para que apunte a `/usr/src/linux.2.x.y`

2.3. Descomprimimos la distribución RTLinux

```
cd /usr/src/
tar xzf rtlinux-3.*.tar.gz
```

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Al realizar esto se ha creado un nuevo directorio `/usr/src/rtlinux-3.*`. Por comodidad podemos crear un enlace `/usr/src/rtlinux` que apunte a `/usr/src/rtlinux.3.*`.

```
cd /usr/src
ln –sf /usr/src/rtlinux-3.* ./rtlinux
```

Al realizar todo esto no ha quedado la siguiente estructura de directorios

```
/usr/src/linux
/usr/src/linux.2.*.*
/usr/src/linux.2.x.y
/usr/src/rtlinux
/usr/src/rtlinux-3.*
```

De ahora en adelante cuando queramos acceder al directorio del código fuente de Linux accederemos mediante `/usr/src/linux` y para acceder a la distribución de RTLinux lo haremos mediante `/usr/src/rtlinux`.

2.4. Enlazar RTLinux con Linux

cd /usr/src/rtlinux
ln –sf /usr/src/linux ./linux

Al realizar esto se crea un nuevo directorio (usr/src/rtlinux/linux), que es un enlace al código fuente de Linux.

3. Antes de comenzar con la instalación

3.1. Ahora comprobamos si la versión de la distribución de RTLinux que nos hemos descargado soporta la versión del kernel que queremos configurar y que también hemos obtenido.

Para ello escribimos:

```
cd /usr/src/rtlinux
grep –A 2 “^\W*VERSION” ./patches/kernel_patch*
```

La salida de este comando es:

```
kernel_patch-2.2: VERSION = 2
kernel_patch-2.2- PATCHLEVEL = 2
kernel_patch-2.2- SUBLEVEL = 17
---
kernel_patch-2.4: VERSION = 2
kernel_patch-2.4- PATCHLEVEL = 4
kernel_patch-2.4- SUBLEVEL = 0
```

El significado de esto es que la versión de esta distribución de RTLinux es valida para la versión del Kernel 2.2.17 y 2.4.0

3.2. Comprobamos también si disponemos del compilador adecuado. Para ello escribimos:

gcc –v

Debemos comprobar que al menos tenemos la versión 2.7.2.3 ó superior de gcc y la 1.1.2 ó superior de egcs. Si no lo tenemos podemos compilarlo con otro compilador pero no esta testeado.

4. Parcheado del Kernel

La instalación de RTLinux consiste en parchear el código fuente de Linux. El parche que usaremos es el valido para nuestro kernel, comprobado en el punto anterior. Para ello usaremos el comando patch. Para saber más sobre este comando escribe:

```
man patch
```

Para parchear escribimos:

```
cd /usr/src/linux
match –p1 < /usr/src/RTLinux/patches/kernel_patch-2.*.*
```

donde kernel_patch-2.*.* se corresponde con el parche que vamos a aplicar a nuestro kernel.

5. Configuración del Kernel

Ahora configuraremos el kernel, lo compilaremos y obtendremos la imagen de nuestro Linux con Tiempo Real.

Nota: Si nunca antes has compilado un kernel ten en cuenta que el tiempo depende de la maquina que dispongas y que puede ser un proceso largo.

Nota: En este punto debería consultar información acerca de las opciones de configuración del kernel si le son desconocidas.

Escribe:

```
cd /usr/src/linux
make mrproper
make config ó make menuconfig ó make xconfig
```

Nota: Hay unas opciones importantes que se deben configurar adecuadamente para que el sistema RTLinux funcione adecuadamente y son:
- Especificar correctamente el tipo de CPU que disponemos. Ejemplo. Pentium MMX.
- Si solo disponemos de una CPU, desactivar el soporte para SMP

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- No activar el soporte de APM. APM BIOS Call puede producir efectos impredecibles en el rendimiento de un sistema de tiempo real.

Una vez configurado adecuadamente nuestro kernel continuamos.

```
make dep
make bzImage
make modules
make modules_install
```

Como resultado de estos comando hemos obtenido nuestra imagen y se encuentra en `/usr/src/linux/arch/i386/boot` y se llama `bzImage`. Esta imagen es la que debemos arrancar para tener nuestro Sistema de Tiempo Real Linux.

6. Configuración del Gestor de arranque

Describo el proceso de configuración para los gestores de arranque LiLo y Grub.

Antes de nada copiamos la imagen de arranque creada anteriormente al directorio /boot.

```
cp /usr/src/linux/arch/i386/boot/bzImage /boot/rtzImage
```

Nota: El formato de los ficheros de configuración puede cambiar según la distribución de Linux que se use, y según la versión del gestor que se use, por lo que es recomendable consultar la documentación para verificar el formato a usar en su sistema.

Nota: Lo importante de este apartado es que se debe crear una entrada en el fichero de configuración correspondiente para la nueva imagen del kernel que se quiere poder arrancar y que es distinta de la que actualmente estamos usando.

LiLo

- Abrimos el fichero de configuración de LiLo: `/etc/lilo.conf`
- Añadimos la siguiente entrada al fichero

```
image = /boot/rtzImage
label = rtlinux
read-only
root = /dev/hda1
```
(el valor correspondiente a la partición donde se encuentre sus sistema Linux)

- Escribe en la consola `/sbin/lilo`
- Comprueba la salida de este comando por si existen errores. Debería ser del estilo de:

```
Added linux *
Added rtlinux
```

El resultado final debería ser parecido a este:

```
prompt
timeout = 50
default = linux
boot=/dev/hda
map=/boot/map
install=/boot/boot.b
message=/boot/message
linear

image = /boot/vmlinuz
      label=Linux
      initrd=/boot/initrd.img
      read-only
      root = /dev/hda1

image = /boot/rtzImage
      label=RTLinux
      initrd=/boot/initrd.img
      read-only
      root = /dev/hda1
```

Grub

- Abrimos el fichero de configuración de Grub: `/boot/grub/menu.lst`
- Añadimos la siguiente entrada:

```
title Rtlinux
    kernel (hd0,0)/boot/rtzImage root=/dev/hda1 vga=0x307
           splash=silent showopts
    initrd (hd0,0)/boot/initrd
```

El resultado final debería ser parecido a este:

```
color white/blue black/light-gray
default 0
gfxmenu (hd0,0)/boot/message
timeout 5

title linux
    kernel (hd0,0)/boot/vmlinuz root=/dev/hda1 vga=0x307
splash=silent showopts
    initrd (hd0,0)/boot/initrd

title floppy
    root (fd0)
    chainloader +1

title failsafe
    kernel (hd0,0)/boot/vmlinuz.shipped root=/dev/hda1 showopts
ide=nodma apm=off acpi=off vga=normal nosmp noapic maxcpus=0 3
    initrd (hd0,0)/boot/initrd.shipped

title Rtlinux
    kernel (hd0,0)/boot/rtzImage root=/dev/hda1 vga=0x307
splash=silent showopts
    initrd (hd0,0)/boot/initrd
```

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Ya tenemos configurado el gestor de arranque de nuestra maquina. Obsérvese que no se ha configurado como kernel por defecto. Para ello en LiLo se debe poner el valor adecuado a la etiqueta `default` y ejecutar `/sbin/lilo` y en Grub modificar el valor de la etiqueta `default` por el adecuado teniendo en cuenta que comienza por 0.

7. Reiniciar el ordenador

Al reiniciar y mostrarnos el gestor de arranque las opciones, sino hemos configurado el nuevo kernel por defecto deberemos seleccionarle para arrancar con él.

8. Configurar RTLinux

El proceso es similar al de configuración del kernel.

```
cd /usrc/src/rtlinux
make config ó make menuconfig ó make xconfig
```

> Nota: En este punto se pueden configurar cosas como Activar las señales ó relojes Posix..

9. Compilar RTLinux

```
make
make devices
make install
```

10. Fin. Ya tiene su sistema de Tiempo Real Linux instalado.

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